

AD-A102 914 ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG MS F/G 13/2
DREDGED MATERIAL RESEARCH, NOTES, NEWS, REVIEWS, ETC. VOLUME D---ETC(U)
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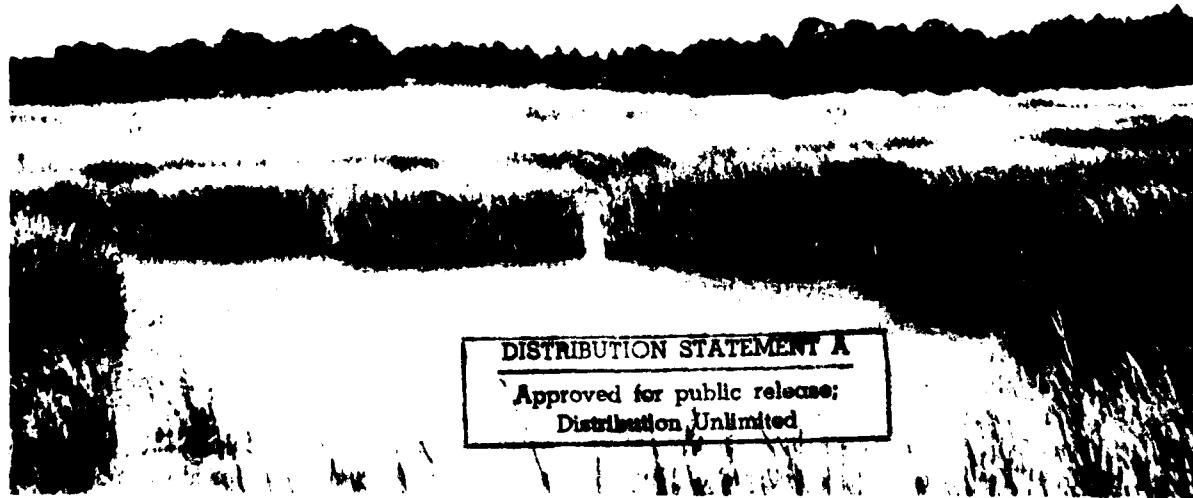
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Vol D-81-2
Aug 1981

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Two new research programs will be initiated in FY 82. General overviews of the Long-Term Effects of Dredging Operations and the Wetlands Research Programs are presented in the following article.

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NEW RESEARCH PROGRAMS

The Directorate of Research and Development of the Office, Chief of Engineers (OCE) has announced two new research programs to be initiated in FY 82. The lead laboratory for both the Long-Term Effects of Dredging Operations (LEDO) and the Wetlands Research Programs will be the Waterways Experiment Station (WES). The programs have been assigned to the WES Environmental Laboratory (EL). Dr. John Harrison, Chief, OCE Technical Monitors for both programs will be Drs. John R. Hall and William L. Klesch.

Since the completion of the Dredged Material Research Program (DMRP) in 1978, continuing environmental studies have been under way to support the Corps' dredging and regulatory programs. The studies conducted under the Dredging Operations Technical Support (DOTS) Program have expanded into the two new research programs. Management of LEDO will remain under DOTS (Mr. Charles C. Calhoun, Jr., Manager), while the Wetlands Program will be managed by the EL Environmental Resources Division (Dr. Conrad J. (Pete) Kirby, Chief). The Wetlands Program Manager will be Dr. Hanley K. (Bo) Smith.

The following is a general overview of the two programs. More details will be contained in subsequent issues of this bulletin.

LEDO PROGRAM

The Corps of Engineers (CE) is legislatively required to evaluate and minimize environmental impacts of dredged material disposal and/or placement of fill that are associated with its dredging and environmental regulatory programs. Dredging operations to maintain the Nation's approximately 25,000 miles of Federal channels and 1,000 harbors is the largest single line item in the total CE budget. The CE's dredging operations necessitate the annual disposal of 250 to 300 million cubic yards of dredged material.

Under Section 404 of Public Law 92-500 (Clean Water Act) and Section 103 of Public Law 92-532 (Ocean Dumping Act), the CE is responsible for permitting the placement of dredged and fill material in the Nation's waterways and the transportation of dredged material for disposal in the oceans. In FY 80, the CE received more than 10,000 permit applications under Sections 404 and

103. Although the CE does not issue permits for its own activities, by law the CE must comply with criteria applied to a permit applicant.

While the CE issues permits for the disposal of dredged material and the placement of fill material under CE regulations, by statutory requirements these regulations are based on criteria and guidelines developed by the Environmental Protection Agency (EPA) in consultation with the CE. Therefore, the CE must be actively involved in applied research as well as taking a direct participatory role in criteria and guideline development. The scope and technical requirements of the criteria and guidelines significantly impact the cost of the CE dredging program as well as non-Federal projects because they require protection of the environment at all levels. They must also consider other applicable Federal and state environmental legislation, Executive Orders, and international agreements, as well as results of litigation. For example, the criteria used in evaluating permit applications under Section 103 must adhere to the technical and legal stipulations of the London Dumping Convention.

By the early 1970s, concerns over the environmental effects of dredging operations reached the stage where Federal legislation mandated the CE to undertake a major study to determine the environmental effects of dredged material disposal and to develop procedures for minimizing any adverse effects. To this end, the Dredged Material Research Program (DMRP) was initiated in 1973 and successfully completed in 1978. The DMRP provided the first definitive information on impacts of dredged material disposal and dispelled many fears expressed at the time.

Due to the relatively short time frame of the DMRP (5 years), all questions related to long-term effects of dredged material disposal could not be addressed. The DOTS Program was established at the completion of the DMRP to assist the field in implementing DMRP technologies and to maintain a capability in the technical area. Low-level monitoring efforts at selected DMRP field sites were undertaken, and limited studies have been under way to develop first-generation procedures to evaluate long-term effects. These efforts have allowed the CE to continue positive influence on the direction of criteria and guideline development on a national and international level as well as to resolve

interpretation conflicts with other regulatory agencies.

In early 1980, the CE, in testimony before two Congressional committees and the Office of Management and Budget, stated there was a critical need for research on the long-term effects of dredging operations. LEDO is designed to address high priority needs on a continuing basis. Specific work units were identified and developed based on highly rated mission problem statements submitted by the field, close coordination with the field through the DOTS Program, and consultation with EPA and other regulatory agencies. The integrated work units allow specific problems of national concern to be addressed while maintaining the flexibility to address future needs resulting from changing environmental legislation and interpretation of regulations. The work units are grouped into two general work areas:

- Effects of aquatic disposal
- Effects of terrestrial disposal

Program Objectives

The principal objectives of LEDO are to provide new or improved technology to predict long-term (including cumulative) environmental impacts of dredging operations and to address methods of minimizing any adverse impacts. The technology will allow the CE to accomplish its dredging and regulatory missions in a manner that is environmentally sound.

Approach

LEDO consists of eight separate but highly integrated work units in the two general work areas and will be carried out by the WES and the Cold Regions Research Engineering Laboratory (CRREL). The six highest priority work units will be initiated in FY 82. A brief summary of the program is presented in Table 1. The work units are planned on a 5-year basis. However, it is recognized that applied environmental research must address current problems, and, consequently, program

Table 1
SUMMARY OF LEDO RESEARCH PROGRAM

Relative Priority	Performing Laboratory	Work Unit Title	Objective
1	WES*	Toxic Substances Bioaccumulation and Biomagnification in Aquatic Organisms	To develop predictive methods for determining the rate and degree of bioaccumulation and biomagnification of toxic substances from contaminated dredged material by aquatic organisms
2	WES*	Environmental Interpretation of Cumulative Effects of Disposal Alternatives	To develop and evaluate procedures for predictive interpretation of cumulative environmental effects of dredged material disposed under various conditions (e.g., near shore, capped, sequential disposal, conventional disposal, etc.)
3	WES*	Field Evaluation of Cumulative Effects	To evaluate the adequacy of predictive techniques for determining cumulative effects through onsite field investigation.
4	WES*	Techniques for Predicting Pollution Potential of Diked Containment Areas	To develop procedures for estimating the level of contaminants in dredged material containment area effluents
5	WES*	Toxic Substances, Bioaccumulation and Biomagnification in Plants	To provide methods to determine bioaccumulation and biomagnification of toxic substances in plants on dredged material disposal sites.
6	WES*	Toxic Substances Bioaccumulation and Biomagnification in Terrestrial Animals	To provide methods to determine bioaccumulation and biomagnification of toxic substances in animals on terrestrial dredged material disposal sites
7	WES	Ecological Significance of Food-Web Impact	To determine the occurrence and importance of biomagnification of toxic substances from dredged material through food webs
8	CRREL	Disposal in Cold Regions	(1) To evaluate the performance of treatment methods of contaminated effluent from confined disposal facilities and (2) to develop methodology for prediction of leachate quality from land disposal of dredged material

*Funded in FY 82.

priorities may change during and after the 5-year period. As a result, the program is planned as a continuing program designed to address changing priorities.

WETLANDS RESEARCH

The primary legislative basis for the Corps' regulatory authority in wetlands is Section 404 of the Clean Water Act, which gives the Corps authority to regulate the discharge of dredged or fill material in the waters of the United States. The objective of this legislation is to maintain and restore the biological, physical, and chemical integrity of the Nation's water quality through regulation of the discharge of dredged and fill material into "Waters of the United States." "Waters of the United States" has broad meaning and incorporates both aquatic and wetland ecosystems (Federal Register 197, p 37144).

Executive Order 11990 recognizes the significance of wetlands and charges each Federal agency to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. The Executive Order established several major requirements for Federal agencies before undertaking any new construction in wetlands:

- Prior to undertaking an action in wetlands, determine whether a practicable alternative to the action exists. If a practical alternative exists, the action shall not be undertaken in wetlands.
- If the action must be undertaken in wetlands, include practical measures to minimize harm to wetlands that may result from such use.
- Preserve and enhance the natural and beneficial values of the wetlands.
- Involve the public early in the planning and decisionmaking process for any action involving new construction in wetlands.

To successfully pursue the regulatory program required by Section 404 of the Clean Water Act and to carry out the mandates of Executive Order 11990, the CE must expand its knowledge in three key areas.

1. The precise and technically defensible delineation of wetlands is essential to regulatory, planning, and construction activities.
2. The ability to identify and differentiate between the various values of different types

of wetlands is necessary to make sound judgments regarding their use.

3. The capability to restore wetlands damaged by permitted or construction activities substantially enhances the agency's flexibility in the management of these resources.

As with LEDO, specific work units were identified and developed based on highly rated mission problem statements submitted by the field, close coordination with the field through the DOTS Program, and consultation with other regulatory agencies and researchers. The work units are grouped into three general work areas:

- Onsite determination
- Functional values
- Restoration

Program Objectives

Priority wetland research needs have been identified in three major areas. The first is to develop improved and standardized techniques to assist CE field personnel in the identification and delineation of wetlands subject to jurisdiction under the Section 404 regulatory program. The second is the assessment and quantification of wetland values for use in the evaluation of permit activities and to meet CE needs in planning, construction, and operational activities in wetland areas. The third is the development of techniques for wetland restoration in permafrost, freshwater interior, and coastal environments.

Approach

A brief summary of the program is presented in Table 2. The program consists of eight work units to be carried out by WES and CRREL. The five highest priority work units will be initiated in FY 82. Research under the Wetlands Program is designed to meet CE short- and long-term information needs in the onsite identification and delineation of wetlands. Functional values research will not meet all needs in part because progress in any scientific endeavor of this magnitude and complexity is slow to develop. Regardless, these studies will substantially contribute to the understanding of many problem areas and will maintain the CE at the forefront of the state-of-the-art of wetland evaluation. Research on the restoration of wetlands will greatly improve the Corps' ability to offset wetland losses incurred in permitted or construction activities. Particularly important advances will be made in restoration of wetlands in

Table 2
SUMMARY OF WETLANDS RESEARCH PROGRAM

Relative Priority	Performing Laboratory	Work Unit Title	Objective
1	WES*	Onsite Determination: Transition Zone Analysis	To develop expedient methods to assist CE personnel with the onsite identification and delineation of wetland boundaries using vegetation
2	WES*	Onsite Determination: Field Expedient Soil and Hydrologic Techniques	To develop regionalized, field expedient soils and hydrologic techniques that provide evidence of saturated soil conditions within the root zone for the purpose of assisting in wetland determinations
3	WES*	Onsite Determination: Nongrowing Season Techniques	To develop techniques on a regional basis for wetlands identification and delineation determinations during the fall and winter seasons
4	WES*	Functional Values: Preliminary Assessment and Measurement Methodology	To identify and develop qualitative techniques for the identification and assessment of wetland functional values to provide early qualitative guidance, and a basic resource to be used before detailed quantitative evaluations are possible
5	WES*	Onsite Determination: Flood Tolerance Indices	To document and evaluate plant tolerance to inundation and/or saturated soil conditions for the purpose of developing quantitative tolerance indices
6	CRREL	Restoration: Restoration of Wetlands in Permafrost Regions	To develop and field test techniques for the restoration of permafrost wetlands disturbed by permitted or construction activities
7	WES	Restoration: Restoration of Wetlands	To develop and field test techniques for restoration of wetlands disturbed by permitted or construction activities.
8	WES	Functional Values: Quantification of Selected Values	To examine selected functional values to develop techniques for their accurate quantitative assessment

*Funded in FY 82.

interior fresh water and permafrost regions. The ability to restore coastal wetlands is considered more advanced than other wetland types.

DOTS ASSISTANCE

Although the Wetlands Research Program will not be carried out under DOTS management,

technical assistance on wetlands matters may still be obtained through DOTS. The DOTS Program provides technical assistance to all Corps elements on environmental problems associated with the Corps dredging and regulatory programs. Requests for assistance should be made to Mr. Calhoun (AC 601/634-3428; FTS 542-3428).

DREDGING CONTAMINATED SEDIMENTS

Beginning in October of this year, studies will be initiated on methods of dredging contaminated sediments. The studies will be conducted as part of the Improvement of Operation and Maintenance Techniques (IOMT) Research Program work unit entitled New Dredging Concepts. The IOMT is a broad-based research program managed by the WES Hydraulics Laboratory. Mr. Richard A. Sager is the IOMT Program Manager. The studies on

dredging contaminated sediments will be under the general management of the DOTS program and under the direct supervision of Mr. Michael R. Palermo, Chief, Water Resources Engineering Group of the EL's Environmental Engineering Division.

Conventional dredges are not specifically designed or intended for use in dredging highly contaminated material. However, dredges are the

logical and perhaps only means of removing contaminated sediments that may be found in the Nation's waterways.

Specific environmental concerns usually cited include resuspension of contaminated sediments and the possibility of contaminant release. Although specific dredging operations involving contaminated sediments have been monitored by various Corps offices and regulatory agencies, data are not available on a national basis to allow the prediction of the impact of operation of a specific dredge in a given situation.

The first phase of the study will be to collect and analyze data available from various Corps offices and other agencies in order to establish a general data base on the performance of conventional dredges. The performance of a dredge is based on numerous factors and development of a methodology for predicting performance must consider these factors. Therefore, for the next phase, performance data from field tests where parameters are held constant will be used to develop a predictive capability.

Information on nonconventional dredges will be also collected. Data on U.S. and foreign dredges specifically designed to clean up highly contaminated sediments will be obtained. Memorandums of Understanding (MOU) currently exist between the

United States and the Japanese and Dutch governments that will allow the U.S. to have access to existing data. The MOUs also allow for cooperative studies to be conducted should such studies be necessary.

The Norfolk District is planning a major field evaluation of two types of equipment to be used to dredge the Federal channel in the kepone-contaminated James River. This operation, scheduled for early next fiscal year, will provide an opportunity to compare the performance of a conventional cutter head dredge and that of a dredge equipped with a specifically designed dust pan head. Environmental parameters will be closely monitored at the dredging and disposal sites. These data will provide extensive information for the comparison of conventional and nonconventional equipment.

The end product of the studies will be a method to predict on a site-specific basis the degree and extent of resuspension of sediments and of contaminant release from dredging operations. The predictive methodology will allow for sound decisions to be made on selection of the type of equipment required for dredging contaminated sediments. The study will be closely coordinated with EPA and other regulatory agencies as well as with the dredging industry.

MEETINGS OF INTEREST

American Society of Civil Engineers
Specialty Conference - Water Forum '81
(Two sessions on dredged material disposal)
10-14 August 1981
Sheraton Palace Hotel
San Francisco, CA

2nd Annual Dredging Seminar
Sponsored by Old Dominion University and
Norfolk District
26-27 August 1981
Lake Wright Motel
Norfolk, VA
Contact Dr. William J. McMahon 804/440-4243

WEDA III - Annual Western Dredging
Association Meeting
1-2 October 1981
Hyatt Regency
Nashville, TN
Contact Mr. George Watts 703/524-6367

Comprehensive Seminar of Dredging and
Related Problems in the Mid-Atlantic Region

Sponsored by Maryland Chapter of National
Association of Professionals and
Eastern Chapter, WEDA
5-7 October 1981
Lord Baltimore Hotel
Baltimore, MD
Contact Mr. Gerald L. Kreiner 301/396-6299

7th U.S./Japan Experts Meeting on Management
of Bottom Sediments Containing Toxic Substances
2-4 November 1981
New York, NY
Contact Mr. C. W. Hummer 202/325-0537

14th Annual Dredging Seminar
12-13 November 1981
Hotel Monteleon
New Orleans, LA
Contact Dr. John B. Herbich 713/845-4545

11th Dredging Engineering Short Course
11-15 January 1982
Texas A&M University
College Station, TX
Contact Dr. John B. Herbich, 713/845-4545

CONFINED DREDGED MATERIAL WORKSHOP

A workshop on Confined Dredged Material Disposal was recently held at WES. The 2-day workshop, sponsored by DOTS, was attended by about 75 participants who were mostly from the Corps. However, State government, consultants, and universities were also represented. The workshop provided instruction on technology developed during the DMRP and refined under DOTS, as well as a forum for field personnel to discuss specific problems and solutions.

The first day consisted of lectures on various components of the design, construction, and management of confined disposal areas (see list below). Lecture notes and appropriate Engineering Manuals were provided for the participants. On the second day, case studies were presented by the Charleston, Baltimore, Savannah, Vicksburg, New York, Mobile, Detroit, and Norfolk Districts and the Maryland Port Authority.

Similar workshops will be presented on a continuing basis, although no date has been set for the next session. Non-Corps individuals interested in attending should write: Mr. Michael R. Palermo, U.S. Army Engineer Waterways Experiment Station (WESEE), PO Box 631, Vicksburg, MS 39180. Corps personnel will be informed of the next workshop through normal channels, and non-Corps individuals will be notified by mail.

Workshop Lectures

Confined Dredged Material Disposal-National Overview	Mr. Charles W. Hummer, Jr. Water Resources Support Center, Dredging Division Ft. Belvoir, Va.
Confined Disposal Research and Technology Transfer	Mr. Charles C. Calhoun, Jr. WES
Design of Disposal Areas for Sedimentation and Initial Storage Capacity	Dr. Raymond L. Montgomery WES
Chemical Treatment Systems for Effluent Suspended Solids	Mr. Paul R. Schroeder WES
Long-Term Storage Capacity of Disposal Areas	Mr. Michael R. Palermo WES
Dredged Material Dewatering	Dr. T. A. Haliburton Haliburton Associates Stillwater, Okla.
Comprehensive Management Plans	Mr. Palermo, WES

Case Histories

Norfolk District	Col. Douglas L. Haller
Charleston District	Mr. Braxton Kyzer
Savannah District	Mr. Walter Schaaf
Vicksburg District	Mr. Jim Farrell
New York District	Mr. James Mansky
Mobile District	Mr. Pat Langan
Detroit District	Mr. Rick Kavalar
Maryland Port Authority & Baltimore District	Mr. Frank Hammons and Mr. Robert Blama



Pictured are participants in the Confined Dredged Material Disposal Workshop recently held at WES.

DOTS PUBLICATIONS

Pequegnat, W. E., et al. 1981. "Procedural Guide for Designation Surveys of Ocean Dredged Material Disposal Sites," Technical Report EL-81-1, prepared by TerEco Corporation, College Station, Texas, under contract to the U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss.

Hammer, D. P. 1981. "Evaluation of Underdrainage Techniques for the Densification of Fine-Grained Dredged Material," Technical Report EL-81-3, Geotechnical Laboratory, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss.

NOTE: Copies of the above reports will be furnished to individual requestors as long as supplies last. Since it is only feasible to print a limited number of copies, requests for single rather than multiple copies by a single office will be appreciated. Please address all requests to the Waterways Experiment Station, ATTN: Ms. D. P. Booth. When supplies are exhausted, copies will be obtainable from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151.

This bulletin is published in accordance with AR 310-2. It has been prepared and distributed as one of the information dissemination functions of the Environmental Laboratory of the Waterways Experiment Station. It was published during the conduct of the Corps of Engineers' nationwide Dredged Material Research Program (DMRP) to disseminate program results rapidly and widely to Corps District and Division offices, as well as other Federal agencies, state agencies, universities, research institutes, and individuals. The DMRP was completed in March 1978, but the bulletin will be published under the Corps' Dredging Operations Technical Support (DOTS) program as part of the program mission to continue information dissemination and to assist in implementation of DMRP results. The bulletin will be issued on an irregular basis as dictated by the quantity and importance of information available for publication. Contributions of news, notes, reviews, or any other type of information are solicited from all sources and will be considered for publication as long as they are relevant to the DOTS theme of providing definitive information on the environmental impact of dredging and dredged material disposal operations and the development of technically satisfactory, environmentally compatible, and economically feasible dredging alternatives, including consideration of dredged material as a manageable resource. Special emphasis is placed on material relating to application of research results or technology to specific project needs. Communications are welcomed and should be addressed to the Environmental Laboratory, ATTN: Mr. C.C. Calhoun, Jr., U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, MS 39180, or call AC 601/636-3111, Ext. 3428 (FTS 542-3428).



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